

AMENDMENTS TO THE CLAIMS:

Claim 1 (currently amended): A cutting tool for simultaneously facing and grooving a target surface by moving in a forward direction defined parallel to said target surface, said cutting tool having a front surface facing said forward direction and comprising a facing part and a grooving part, ~~wherein each of said side surfaces of said grooving part and said facing surface part join through beveled surface portion part, said facing part and said~~ grooving part each having a bottom surface, the bottom surfaces of said facing part and said grooving part being apart and parallel to each other, making a specified bottom clearance angle, said grooving part protruding from the bottom surface of said facing part, said grooving part and the bottom surface of said facing part joining through beveled surface portions.

Claim 2 (original): The cutting tool of claim 1 wherein said beveled surface is smoothly curved with a minimum radius of curvature of 0.05mm.

Claim 3 (currently amended): The cutting tool of claim 1 wherein said beveled surface portion includes one or more mutually adjacent flat surface parts, each of said one or more flat surface parts making ~~30° - 60°~~ 30° - 60° with said facing surface.

Claim 4 (currently amended): The cutting tool of claim 1 wherein:
said facing part has a width of ~~0.2 - 50mm~~ 0.2 - 50mm in a lateral direction parallel to said target surface and perpendicular to said forward direction, and surface roughness of ~~50 - 1000 mesh~~ 50 - 1000 microinches on said facing part bottom surface; and
said grooving part protrudes from said facing bottom surface of said facing part towards said target surface by a groove depth of ~~0.1 - 0.5mm~~ 0.1 - 0.5mm.

Claim 5 (currently amended): The cutting tool of claim 2 wherein:
said facing part has a width of ~~0.2 - 50mm~~ 0.2 - 50mm in a lateral direction parallel to said target surface and perpendicular to said forward direction, and surface roughness of ~~50 - 1000 mesh~~ 50 - 1000 microinches on said facing part bottom surface; and
said grooving part protrudes from said facing bottom surface of said facing part

towards said target surface by a groove depth of ~~0.1—0.5mm~~ 0.1 - 0.5mm.

Claim 6 (currently amended): The cutting tool of claim 3 wherein:
said facing part has a width of ~~0.2—50mm~~ 0.2 - 50mm in a lateral direction parallel
to said target surface and perpendicular to said forward direction, and surface roughness of
~~50—1000 mesh~~ 50 - 1000 microinches on said facing part bottom surface; and
said grooving part protrudes from said facing bottom surface of said facing part
towards said target surface by a groove depth of ~~0.1—0.5mm~~ 0.1 - 0.5mm.

Claim 7 (currently amended): The cutting tool of claim 4 wherein:
said facing front surface makes a facing edge angle of ~~10°—110°~~ 10° - 110° with said
bottom surface;
said grooving part has surface roughness ~~200—3000 mesh~~ 200 - 3000 microinches on
said front surface, side surfaces with surface roughness ~~200—3000 mesh~~ 200 - 3000
microinches, a maximum width of ~~0.1—10mm~~ 0.1 - 10mm in said lateral direction on said
front surface and a bottom grooving surface with surface roughness of ~~200—3000 mesh~~ 200
- 3000 microinches; and
said bottom grooving surface makes a bottom clearance angle of ~~-10°—+80°~~ -10° -
+80° with said target surface and a top rake angle of ~~10°—110°~~ 10° - 110° with said front
surface.

Claim 8 (currently amended): The cutting tool of claim 5 wherein:
said facing front surface makes a facing edge angle of ~~10°—110°~~ 10° - 110° with said
bottom surface;
said grooving part has surface roughness ~~200—3000 mesh~~ 200 - 3000 microinches on
said front surface, side surfaces with surface roughness ~~200—3000 mesh~~ 200 - 3000
microinches, a maximum width of ~~0.1—10mm~~ 0.1 - 10mm in said lateral direction on said
front surface and a bottom grooving surface with surface roughness of ~~200—3000 mesh~~ 200
- 3000 microinches; and
said bottom grooving surface makes a bottom clearance angle of ~~-10°—+80°~~ -10° -
+80° with said target surface and a top rake angle of ~~10°—110°~~ 10° - 110° with said front
surface.

Claim 9 (currently amended): The cutting tool of claim 6 wherein:
said facing front surface makes a facing edge angle of ~~10°—110°~~ 10° - 110° with said bottom surface;
said grooving part has surface roughness ~~200—3000 mesh~~ 200 - 3000 microinches on said front surface, side surfaces with surface roughness ~~200—3000 mesh~~ 200 - 3000 microinches, a maximum width of ~~0.1—10mm~~ 0.1 - 10mm in said lateral direction on said front surface and a bottom grooving surface with surface roughness of ~~200—3000 mesh~~ 200 - 3000 microinches; and
said bottom grooving surface makes a bottom clearance angle of ~~-10°—+80°~~ -10° - +80° with said target surface and a top rake angle of ~~10°—110°~~ 10° - 110° with said front surface.

Claim 10 (original): The cutting tool of claim 7 wherein said grooving part has a gradually decreasing width from said front surface whereby said side surfaces of said grooving part is not parallel, creating a side clearance angle

Claim 11 (original): The cutting tool of claim 8 wherein said grooving part has a gradually decreasing width from said front surface whereby said side surfaces of said grooving part is not parallel, creating a side clearance angle

Claim 12 (original): The cutting tool of claim 9 wherein said grooving part has a gradually decreasing width from said front surface whereby said side surfaces of said grooving part is not parallel, creating a side clearance angle

Claim 13 (original): The cutting tool of claim 7 wherein each of said side surfaces of said grooving has a tapered bottom portion and a tapering angle less than 30° and a height of less than 0.2mm.

Claim 14 (original): The cutting tool of claim 8 wherein each of said side surfaces of said grooving has a tapered bottom portion and a tapering angle less than 30° and a height of less than 0.2mm.

Claim 15 (original): The cutting tool of claim 9 wherein each of said side surfaces of said grooving has a tapered bottom portion and a tapering angle less than 30° and a height of less than 0.2mm.

Claim 15 (original): The cutting tool of claim 10 wherein each of said side surfaces of said grooving has a tapered bottom portion and a tapering angle less than 30° and a height of less than 0.2mm.

Claim 16 (original): The cutting tool of claim 11 wherein each of said side surfaces of said grooving has a tapered bottom portion and a tapering angle less than 30° and a height of less than 0.2mm.

Claim 18 (original): The cutting tool of claim 12 wherein each of said side surfaces of said grooving has a tapered bottom portion and a tapering angle less than 30° and a height of less than 0.2mm.

Claim 19 (original): A method of simultaneously facing a target surface and cutting a groove therein, said method comprising the step of preparing a cutting tool as described in claim 1 and moving said cutting tool parallel to said target surface while contacting said target surface wherein a groove with specified dimensions is cut in said target surface simultaneously as said target surface is polished to a specified surface roughness.

AMENDMENTS TO THE SPECIFICATION:

Paragraph starting at line 29 of page 3 has been amended as follows:

The dimensions of the facing and grooving parts and the roughness of their surfaces, as well as the angles of their cutting edges and the sloping angles of the facing and grooving surfaces with respect to the forward direction defined as the direction of motion of the cutting tool in actual operation with respect to the target surface are each required to be within a specified range, depending on the physical properties of the target material such as hardness and elasticity. For example, the angles of the cutting edges of the facing and grooving parts, herein respectively referred to as the facing edge angle and the top rake angle, may be even obtuse, depending on the nature of the material, and may be ~~10° - 110°~~ 10° - 110°, and the facing and grooving surfaces may have a bottom clearance angle which may be even negative, again depending on the nature of the target material, and is generally required to be within the range of ~~-10° - +80°~~ -10° - +80°. The surface roughness of the facing surface is ~~50 - 1000 mesh~~ 50 - 1000 mesh (or microinches) and that of the grooving surface and the side surfaces of the grooving part is ~~200 - 3000 mesh~~ 200 - 3000 mesh (or microinches).

Paragraph starting at line 29 of page 5 has been amended as follows:

As shown in Fig. 1, the facing part 20 has a width (the "facing width") within the range of ~~0.2mm - 50mm~~ 0.2mm - 50mm, depending on the desired dimensions of the grooves to be formed on the target surface. Throughout herein, the word "width" will be used to denote a dimension in the lateral direction, which is perpendicular to the aforementioned forward direction and parallel to the target surface. The facing part 20 has a bottom surface 22 (the "facing surface") with surface roughness in the range of ~~50 - 1000 mesh~~ 50 - 1000 mesh (or microinches) for carrying out the facing work on the target surface and the grooving part 30 protrudes from a middle portion of this bottom surface 22. The bottom surface 22 and the front surface 21 make a facing edge angle in the range of ~~10 - 110°~~ 10 - 110° therebetween, depending on the physical characteristic of the material of the target surface to be cut.

Paragraph starting at line 8 of page 6 has been amended as follows:

The distance, by which the grooving part 30 protrudes from the facing part 20 as seen from the front (as shown in Fig. 1), is herein referred to as the groove depth because this determines the depth to which grooves are intended to be cut into the target surface and may be typically in the range of ~~0.1—5mm~~ 0.1 - 5mm. The maximum width of the grooving part 30 (as shown in Fig. 1) is herein referred to as the groove width because this determines the width of the grooves intended to be cut and may be typically in the range of ~~0.1—10mm~~ 0.1 - 10mm. As shown in Fig. 3, the width of the grooving part 30 is the largest at its front surface and decreases gradually in the backward direction. In other words, the side surfaces of the grooving part 30 are not parallel. Their side clearance angles (indicated in Fig. 3) depend on the largest curvature (or the smallest radius of curvature) of a curved pattern of the grooves to be cut. The surface roughness of the side surfaces of the grooving part 30 is in the range of ~~200—3000 mesh~~ 200 - 3000 mesh (or microinches).

Paragraph starting at line 20 of page 6 has been amended as follows:

The grooving part 30 has a bottom surface 32 with surface roughness in the range of ~~200—3000 mesh~~ 200 - 3000 mesh (or microinches). The angle between the bottom surface 32 (the "grooving surface") of the grooving part 30 and its front surface 31 may be referred to as the cutting insert's top rake angle 15 and is in the range of ~~10—110°~~ 10 ~ 110°. Fig. 2 shows an example wherein the front surfaces 21 and 31 of the facing part 20 and the grooving part 31 are coplanar and their bottom surfaces 22 and 32 are parallel to each other such that the facing edge angle and the top rake angle are the same, but this not intended to limit the scope of this invention where the coplanar and parallel surfaces are not exclusively mutual to each other.

Paragraph starting at line 21 of page 7 has been amended as follows:

The invention does not impose any stringent requirement on the size of the curved beveled portion 25 as long as it is sufficiently large, say a quarter circle curve with a radius over 0.05mm. The invention does not impose any stringent requirement on the angle of obliqueness of the straight beveled surface 25' as long as it is sufficiently oblique, say, being in the range of ~~30°—60°~~ 30° - 60°. Neither does the invention impose any stringent requirement on the width of the straight beveled surface 25' (that is, the distance between where it joins the side surface of the grooving part 30 and where it joins the facing surface 22) as long as it is sufficiently large, say, over 0.07mm in view of the types of material intended to be processed by the tool 10, such that the tool will not operate as if the corners between the side surfaces of the grooving part 30 and the facing surface 22 are not beveled at all.

Paragraph starting at line 9 of page 8 has been amended as follows:

The "straight beveled surface portion", required according to this invention between each side surface of the grooving part 30 and the facing surface 22, may consist of two or more mutually adjacent surface parts which are each flat and sufficiently oblique (making an angle in the range of ~~30°—60°~~ 30° - 60° with the side surface of the grooving part 30), as shown in Fig. 6. In the description of the scope of the invention that follows, the expression "width" of a straight beveled surface portion with two or more flat surface parts such as shown in Fig. 6, is intended to mean the sum of the widths of the individual surface parts.